

$$\text{ave.} = 7.5$$

$$\sigma = 1.8$$

Quiz #2: Kinematics in One Dimension

Problem 1 (1.5 points)

A rock is thrown straight upwards in the absence of air resistance. A brief moment later, a second rock is thrown straight upwards from the exact same height. Is it possible for both rocks to reach the same maximum height at the same time?

B

- a) yes
b) no

If second rock is thrown at same speed, both will reach same max height at different times. If second rock is thrown faster, it will reach a greater max height.

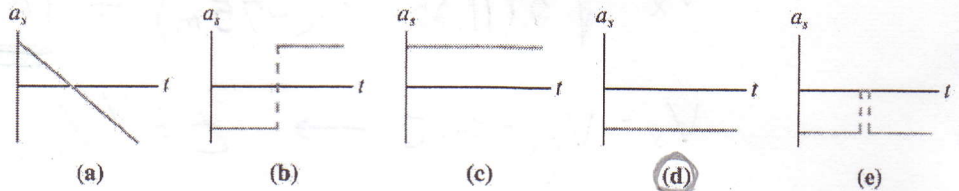
Problem 2 (1.5 points)

A ball rolls up the ramp and then back down. Which is the correct acceleration graph (assuming we define up the ramp as positive)?

D



© 2017 Pearson Education, Inc.



$a = g \sin \theta$ down the incline

Problem 2 (3 points)

A ballplayer catches a ball at the same height it was thrown at 4.50 s after throwing it vertically upward in the absence of air resistance. What maximum height did the ball reach?

y_0	y	v_{0y}	v_y	a_y	$=$	t
0m	$?$	0m/s	-9.80m/s^2	2.25s		

first find v_{0y} from
time to top = $4.50\text{s}/2$

$$v_y = v_{0y} + a_y t \rightarrow v_{0y} = -a_y t = -(-9.80\text{m/s}^2)(2.25\text{s})$$

$$v_{0y} = 22.05\text{m/s}$$

now find y when $t = 2.25\text{s}$

$$y = y_0 + v_{0y} t + \frac{1}{2} a_y t^2$$

$$y = (22.05\text{m/s})(2.25\text{s}) + \frac{1}{2}(-9.80\text{m/s}^2)(2.25\text{s})^2$$

$$y = 24.8\text{m}$$

Problem 4 (4 points)

Super Joe, using his incredible Physics knowledge, starts from rest and accelerates at a spectacular rate of 11.25 m/s^2 for a distance of 475 m . He then uses his awesome powers to slow down at the rate of -7.50 m/s^2 until he comes to rest. (a) What is the total distance traveled by Super Joe? (b) How long was Super Joe in motion, from start to stop?

Part 1:

x_0	x	v_{0x}	v_x	a_x	t
0 m	475 m	0 m/s	?	11.25 m/s^2	?

$$v_x^2 = v_{0x}^2 + 2a_x(x - x_0) \rightarrow v_x = \pm \sqrt{2a_x x}$$

$$v_x = \sqrt{2(11.25 \text{ m/s}^2)(475 \text{ m})} = \underline{103.4 \text{ m/s}}$$

$$v_x = v_{0x} + a_x t \rightarrow t = v_x / a_x = \frac{103.4 \text{ m/s}}{11.25 \text{ m/s}^2} = \underline{9.19 \text{ s}}$$

Part 2:

x_0	x	v_{0x}	v_x	a_x	t
0 m	?	103.4 m/s	0 m/s	-7.50 m/s^2	?

$$v_x = v_{0x} + a_x t \rightarrow t = -v_{0x} / a_x = \frac{-103.4 \text{ m/s}}{-7.50 \text{ m/s}^2}$$

$$t = \underline{13.8 \text{ s}}$$

$$x = x_0 + v_{0x} t + \frac{1}{2} a_x t^2 \rightarrow x = v_{0x} t + \frac{1}{2} a_x t^2$$

$$x = (103.4 \text{ m/s})(13.8 \text{ s}) + \frac{1}{2}(-7.50 \text{ m/s}^2)(13.8 \text{ s})^2 = \underline{713 \text{ m}}$$

(a) total distance = $475 \text{ m} + 713 \text{ m} = \underline{1188 \text{ m}}$

(b) total time = $9.19 \text{ s} + 13.8 \text{ s} = \underline{23.0 \text{ s}}$

$$= \underline{1.19 \times 10^3 \text{ m}}$$